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### 5.1.11.2 WAC FM LINEARITY CALIBRATION RESULTS

As reported in Reference 5.1.11.2-1

Reference 5.1.11.2-1 - IOM 388-PAG-CCA97-6, "WAC FM Calibration Results: Linearity", C. Avis, September 24, 1997

### 5.1.11.2.1 INTRODUCTION

The Wide-angle Flight Model thermal/vacuum testing included the acquisition of a set of images for determination of the system gain. The image data was taken at a temperature of  $+25^{\circ}$  and  $+5^{\circ}$  C. This data set is also applicable to the derivation of the system linearity. The term 'linearity' describes how closely the camera response to light fits a linear function.

#### 5.1.11.2.2 METHOD

For this camera system, the DN resulting from an exposure may be described by the following equation.

$$DN = VL(T - t_0) + DC_T + DN_0$$

where DN is the measured pixel value

V is the system sensitivity (in DN/radiance\_unit-milliseconds)

L is the measured radiance (in arbitrary radiance\_units)

T is the commanded exposure time (in milliseconds)

t<sub>0</sub> is the known shutter-offset (a function of image sample number, in msec)

 $DN_0$  is the bias level (in DN)

DC<sub>T</sub> is the dark-current level (a function of exposure time, in DN)

Analysis so far of  $DC_T$  indicates that for the exposure used here (maximum of 1000 msec), this value should be less than one DN. Therefore, the above equation is simplified to

$$DN = VL(T - t_0) + DN_0$$

Because the shutter-offset was previously derived, only V and  $DN_0$  need to be solved for.  $DN_0$  could be measured by zero-exposure images, but it falls out of the least-squares fit anyway.

Images at the same signal level are combined to produce signal and energy values at 100 small (20 pixel by 20 pixel) areas at all available signal levels. Energy values come from the product of the exposure time (corrected for shutter-offset) and the radiance of the source. Values for Sensitivity and the Bias level are then derived at each of these small areas independently. This is done by solving the above equation using least-squares.

The 100 derived values are then compared and any areas giving values more than 2 sigma from the mean are flagged as bad. Global values for V and  $DN_0$  are then derived by averaging the values at the remaining good areas.

Using these best-fit V and  $DN_0$ , a calculated value DN can be determined for each exposure time. The absolute deviation from linearity

$$A(T) = DN(T) - DN(T)$$

and the relative deviation from linearity

$$R(T) = (DN(T) - DN(T))/DN(T)$$

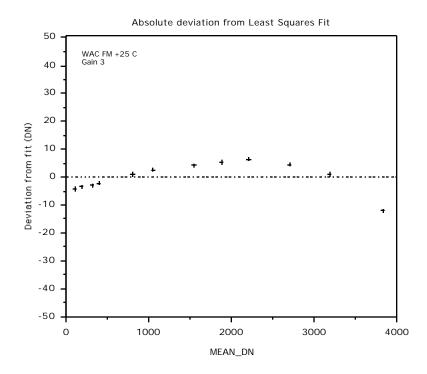
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can be used as measures of linearity over the range of exposure times used.

# 5.1.11.2.3 RESULTS

The following plot shows a typical fit. The absolute deviation is plotted to illustrate how the Least Squares solution distributed the deviations over the range of DN.

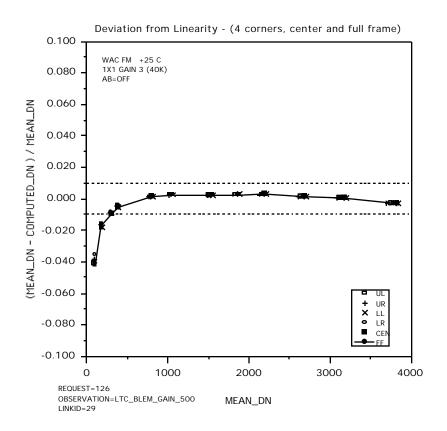


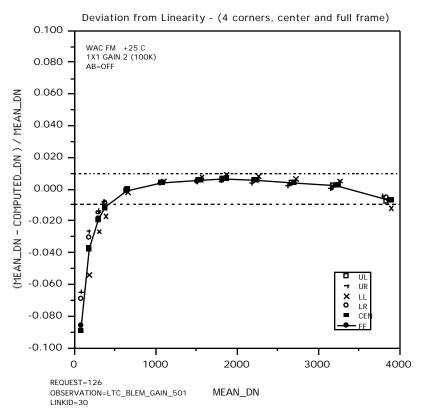
Generating the relative deviation from the absolute deviation distorts the symmetry of the absolute deviation curve by dividing by small mean DN numbers on one end and by large ones on the other. This typically yields a plot with worse relative deviations at the low DN range.

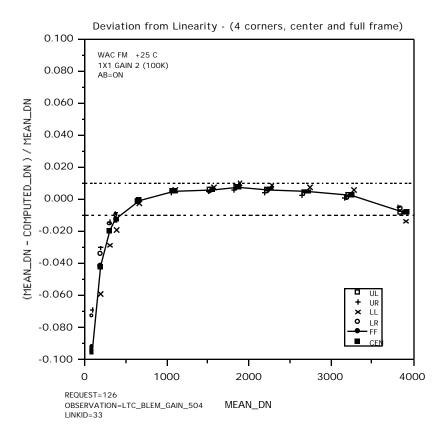
The plots which follow show the deviation from linearity for each Gain state. The deviation is shown as a function of signal level for the corner regions, the center and for the whole frame. Points for each region are plotted and the line connects the points for the entire frame. The dashed lines indicate  $\pm 1$  % deviation.

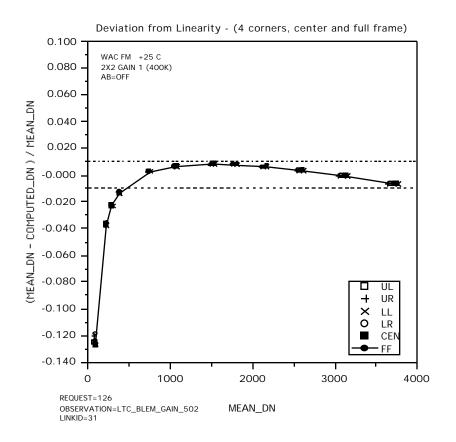
## Notes:

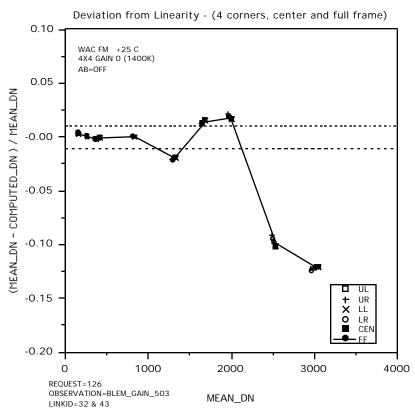
1. Due to linearity problems, the best-fit V and DN<sub>0</sub> for Gain 0 were calculated using exposure times of 0 to 70 milliseconds.

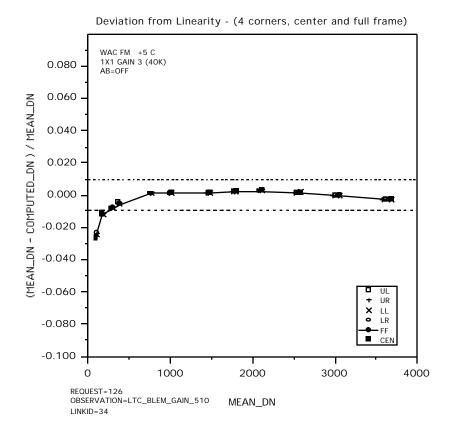


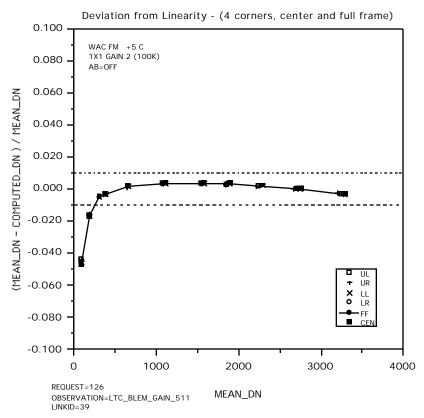


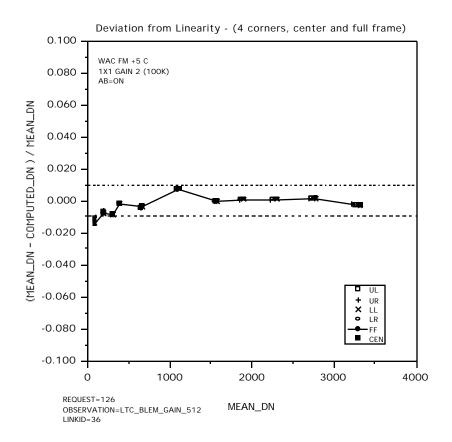


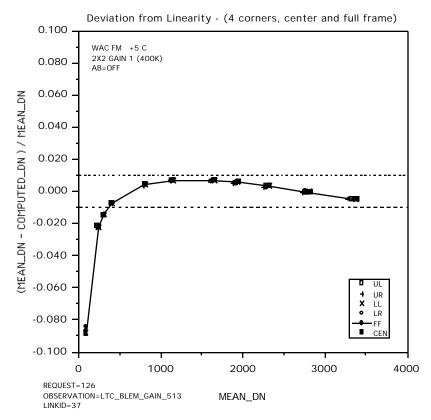


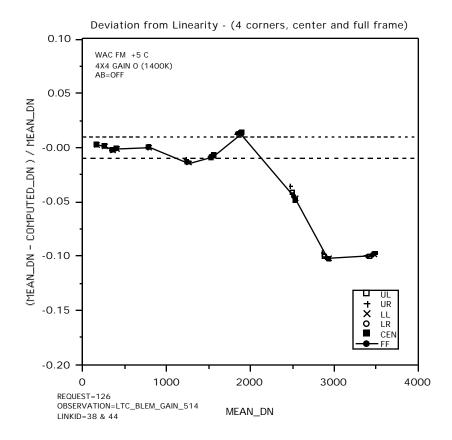












# 5.1.11.2.4 CONCLUSIONS

- 1. Except for 4x4 Gain=0, all gains and summation modes remained linear (within  $\pm 1$  percent) over the entire dynamic range (excluding deviations at the extreme low end).
- 2. In 4x4 Gain=0, linearity breaks down at about 1000 DN at both temperatures.
- 3. Temperatures had no significant effect on the linearity results.
- 4. Antiblooming had no significant effect on the linearity results.

# 5.1.11.2.5 IMAGES USED IN LINEARITY ANALYSIS

i mage	day	time	observation	gai n	mode	expos	radi ance								
126933	180	4:47:40.0	LTC BLEM GAIN 500	3 (40K)	FULL	5	45.20	126956	180	5:20:15.0	LTC BLEM GAIN 500	3 (40K)	FULL	220	45.20
126934	180	4:49:9.0	LTC BLEM GAIN 500		FULL		45.20	126957	180		LTC BLEM GAIN 500		FULL		45.20
126935	180	4:50:38.0	LTC BLEM GAIN 500		FULL	5	45.20	126958	180	5:23:13.0	LTC BLEM GAIN 500	3 (40K)	FULL	260	45.20
126936	180	4:51:44.0	LTC BLEM GAIN 500	3 (40K)	FULL	15	45.20	126959	180	5:24:42.0	LTC BLEM GAIN 500	3 (40K)	FULL	260	45.20
126937	180	4:53:13.0	LTC BLEM GAIN 500		FULL	15	45.20	126960	180	5:25:48.0		3 (40K)	FULL	320	45.20
126938	180	4:54:42.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	15	45.20	126961	180	5:27:17.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	320	45.20
126939	180	4:56:11.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	30	45.20	126962	180	5:28:46.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	320	45.20
126940	180	4:57:40.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	30	45.20	126963	180	5:30:15.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	380	45.20
126941	180	4:59:9.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	30	45.20	126964	180	5:31:44.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	380	45.20
126942	180	5:0:15.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	40	45.20	126965	180	5:33:13.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	380	45.20
126943		5:1:44.0	LTC_BLEM_GAIN_500		FULL	40	45.20	126966			LTC_BLEM_GAIN_500		FULL		45.20
126944	180	5:3:13.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	40	45.20	126967	180	5:35:48.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	460	45.20
126945	180	5:4:42.0	LTC_BLEM_GAIN_500		FULL	90	45.20	126968	180			3 (40K)	FULL	460	45.20
126946	180	5:6:11.0	LTC_BLEM_GAIN_500		FULL	90	45.20	126840	180		LTC_BLEM_GAIN_501	2 (100K		5	50.20
126947	180	5:7:40.0	LTC_BLEM_GAIN_500		FULL	90	45.20	126841	180	1:19:0.0	LTC_BLEM_GAIN_501	2 (100K		5	50.20
126948	180	5:8:46.0	LTC_BLEM_GAIN_500		FULL	120	45.20	126875	180		LTC_BLEM_GAIN_501	2 (100K		5	50.20
126949	180	5:10:15.0	LTC_BLEM_GAIN_500		FULL	120	45.20	126842			LTC_BLEM_GAIN_501	2 (100K		30	50.20
126950	180	5:11:44.0	LTC_BLEM_GAIN_500		FULL	120	45.20	126843			LTC_BLEM_GAIN_501	2 (100K		30	50.20
126952	180	5:14:42.0	LTC_BLEM_GAIN_500		FULL	180	45.20	126844	180		LTC_BLEM_GAIN_501	2 (100K		30	50.20
126953	180	5:16:11.0	LTC_BLEM_GAIN_500		FULL	180	45.20	126845		1:24:33.0	LTC_BLEM_GAIN_501	2 (100K		60	50.20
126969	180	6:11:48.0	LTC_BLEM_GAIN_500		FULL	180	45.20	126846	180		LTC_BLEM_GAIN_501	2 (100K		60	50.20
126954	180	5:17:17.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	220	45.20	126847	180		LTC_BLEM_GAIN_501	2 (100K		60	50.20
126955	180	5:18:46.0	LTC_BLEM_GAIN_500	3 (40K)	FULL	220	45.20	126849	180	1:30:6.0	LTC_BLEM_GAIN_501	2 (100K	) FULL	80	50.20

126850 180 1:31:35.0 LTC_BLEM_GAIN_501 126876 180 2:12:37.0 LTC_BLEM_GAIN_501 126852 180 1:34:33.0 LTC_BLEM_GAIN_501	2 (100K) FULL 80 50.20 2 (100K) FULL 80 50.20 2 (100K) FULL 150 50.20	129894 194 14:7:21.0 LTC_BLEM_GAIN_510 3 (4 129895 194 14:8:50.0 LTC_BLEM_GAIN_510 3 (4	10K) FULL 120 42.80 10K) FULL 180 42.80 10K) FULL 180 42.80
126853 180 1:36:2.0 LTC_BLEM_GAIN_501 126877 180 2:14:6.0 LTC_BLEM_GAIN_501 126854 180 1:37:8.0 LTC_BLEM_GAIN_501 126855 180 1:38:37.0 LTC_BLEM_GAIN_501	2 (100K) FULL 150 50.20 2 (100K) FULL 150 50.20 2 (100K) FULL 260 50.20 2 (100K) FULL 260 50.20	129897 194 14:11:24.0 LTC_BLEM_GAIN_510 3 (4 129898 194 14:12:53.0 LTC_BLEM_GAIN_510 3 (4	10K) FULL 180 42.80 10K) FULL 220 42.80 10K) FULL 220 42.80 10K) FULL 260 42.80
126856 180 1:41:35.0 LTC_BLEM_GAIN_501 126857 180 1:41:35.0 LTC_BLEM_GAIN_501 126858 180 1:43:4.0 LTC_BLEM_GAIN_501	2 (100K) FULL 260 50.20 2 (100K) FULL 380 50.20 2 (100K) FULL 380 50.20	129901 194 14:17:21.0 LTC_BLEM_GAIN_510 3 (4 129902 194 14:18:50.0 LTC_BLEM_GAIN_510 3 (4 129914 194 14:45:6.0 LTC_BLEM_GAIN_510 3 (4	10K) FULL 260 42.80 10K) FULL 260 42.80 10K) FULL 260 42.80
126859 180 1:44:33.0 LTC_BLEM_GAIN_501 126861 180 1:47:8.0 LTC_BLEM_GAIN_501 126862 180 1:48:37.0 LTC_BLEM_GAIN_501 126878 180 2:15:12.0 LTC_BLEM_GAIN_501	2 (100K) FULL 380 50.20 2 (100K) FULL 460 50.20 2 (100K) FULL 460 50.20 2 (100K) FULL 460 50.20	129904 194 14:21:24.0 LTC_BLEM_GAIN_510 3 (4 129905 194 14:22:53.0 LTC_BLEM_GAIN_510 3 (4	10K) FULL 320 42.80 10K) FULL 320 42.80 10K) FULL 320 42.80 10K) FULL 380 42.80
126863 180 1:50:6.0 LTC_BLEM_GAIN_501 126864 180 1:51:35.0 LTC_BLEM_GAIN_501 126865 180 1:53:4.0 LTC_BLEM_GAIN_501	2 (100K) FULL 560 50.20 2 (100K) FULL 560 50.20 2 (100K) FULL 560 50.20	129907 194 14:25:52.0 LTC_BLEM_GAIN_510 3 (4 129908 194 14:27:21.0 LTC_BLEM_GAIN_510 3 (4 129909 194 14:28:32.0 LTC_BLEM_GAIN_510 3 (4	10K) FULL 380 42.80 10K) FULL 380 42.80 10K) FULL 460 42.80
126866 180 1:54:10.0 LTC_BLEM_GAIN_501 126867 180 1:55:39.0 LTC_BLEM_GAIN_501 126868 180 1:57:8.0 LTC_BLEM_GAIN_501 126869 180 1:58:37.0 LTC_BLEM_GAIN_501	2 (100K) FULL 680 50.20 2 (100K) FULL 680 50.20 2 (100K) FULL 680 50.20 2 (100K) FULL 820 50.20	129911 194 14:31:30.0 LTC_BLEM_GAIN_510 3 (4 130106 195 3:14:9.0 LTC_BLEM_GAIN_511 2 (1	10K) FULL 460 42.80 10K) FULL 460 42.80 100K) FULL 5 50.20 100K) FULL 5 50.20
126871 180 2:1:35.0 LTC_BLEM_GAIN_501 126879 180 2:16:18.0 LTC_BLEM_GAIN_501 126973 180 6:59:10.0 LTC_BLEM_GAIN_502	2 (100K) FULL 820 50.20 2 (100K) FULL 820 50.20 1 (400K) SUM2 5 47.70	130141 195 4:13:6.0 LTC_BLEM_GAIN_511 2 (1 130108 195 3:16:44.0 LTC_BLEM_GAIN_511 2 (1 130109 195 3:18:13.0 LTC_BLEM_GAIN_511 2 (1	LOOK) FULL 5 50.20 LOOK) FULL 30 50.20 LOOK) FULL 30 50.20
126974 180 7:0:14.0 LTC_BLEM_GAIN_502 126975 180 7:1:18.0 LTC_BLEM_GAIN_502 126976 180 7:1:57.0 LTC_BLEM_GAIN_502 126977 180 7:3:1.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 5 47.70 1 (400K) SUM2 5 47.70 1 (400K) SUM2 35 47.70 1 (400K) SUM2 35 47.70	130111 195 3:21:11.0 LTC_BLEM_GAIN_511 2 (1 130112 195 3:22:40.0 LTC_BLEM_GAIN_511 2 (1	LOOK) FULL 30 50.20 LOOK) FULL 60 50.20 LOOK) FULL 60 50.20 LOOK) FULL 60 50.20
126978 180 7:4:5.0 LTC_BLEM_GAIN_502 126979 180 7:5:9.0 LTC_BLEM_GAIN_502 126980 180 7:6:13.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 35 47.70 1 (400K) SUM2 50 47.70 1 (400K) SUM2 50 47.70	130114 195 3:25:15.0 LTC_BLEM_GAIN_511 2 (1 130116 195 3:28:13.0 LTC_BLEM_GAIN_511 2 (1 130142 195 4:14:12.0 LTC_BLEM_GAIN_511 2 (1	LOOK) FULL 80 50.20 LOOK) FULL 80 50.20 LOOK) FULL 80 50.20
126981 180 7:7:17.0 LTC_BLEM_GAIN_502 126982 180 7:8:0.0 LTC_BLEM_GAIN_502 126983 180 7:9:4.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 50 47.70 1 (400K) SUM2 70 47.70 1 (400K) SUM2 70 47.70 1 (400K) SUM2 70 47.70	130119 195 3:32:40.0 LTC_BLEM_GAIN_511 2 (1 130143 195 4:15:41.0 LTC_BLEM_GAIN_511 2 (1	100K) FULL 150 50.20 100K) FULL 150 50.20 100K) FULL 150 50.20
126984 180 7:10:8.0 LTC_BLEM_GAIN_502 126985 180 7:11:12.0 LTC_BLEM_GAIN_502 126986 180 7:12:16.0 LTC_BLEM_GAIN_502 126987 180 7:13:20.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 70 47.70 1 (400K) SUM2 150 47.70 1 (400K) SUM2 150 47.70 1 (400K) SUM2 150 47.70	130121 195 3:35:15.0 LTC_BLEM_GAIN_511 2 (1 130122 195 3:36:44.0 LTC_BLEM_GAIN_511 2 (1	LOOK) FULL 260 50.20 LOOK) FULL 260 50.20 LOOK) FULL 260 50.20 LOOK) FULL 380 50.20
126988 180 7:13:59.0 LTC_BLEM_GAIN_502 126989 180 7:15:3.0 LTC_BLEM_GAIN_502 126990 180 7:16:7.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 220 47.70 1 (400K) SUM2 220 47.70 1 (400K) SUM2 220 47.70	130124 195 3:39:42.0 LTC_BLEM_GAIN_511 2 (1 130125 195 3:41:11.0 LTC_BLEM_GAIN_511 2 (1 130126 195 3:42:17.0 LTC_BLEM_GAIN_511 2 (1	LOOK) FULL 380 50.20 LOOK) FULL 380 50.20 LOOK) FULL 460 50.20
126991 180 7:17:11.0 LTC_BLEM_GAIN_502 126992 180 7:18:15.0 LTC_BLEM_GAIN_502 126993 180 7:19:19.0 LTC_BLEM_GAIN_502 126994 180 7:20:2.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 320 47.70 1 (400K) SUM2 320 47.70 1 (400K) SUM2 320 47.70 1 (400K) SUM2 380 47.70	130128 195 3:45:15.0 LTC_BLEM_GAIN_511 2 (1 130129 195 3:46:44.0 LTC_BLEM_GAIN_511 2 (1	LOOK) FULL 460 50.20 LOOK) FULL 460 50.20 LOOK) FULL 560 50.20 LOOK) FULL 560 50.20
126995 180 7:21:6.0 LTC_BLEM_GAIN_502 126996 180 7:22:10.0 LTC_BLEM_GAIN_502 126997 180 7:23:14.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 380 47.70 1 (400K) SUM2 380 47.70 1 (400K) SUM2 460 47.70	130131 195 3:49:42.0 LTC_BLEM_GAIN_511 2 (1 130132 195 3:50:48.0 LTC_BLEM_GAIN_511 2 (1 130133 195 3:52:17.0 LTC_BLEM_GAIN_511 2 (1	LOOK) FULL 560 50.20 LOOK) FULL 680 50.20 LOOK) FULL 680 50.20
126998 180 7:24:18.0 LTC_BLEM_GAIN_502 126999 180 7:25:22.0 LTC_BLEM_GAIN_502 127000 180 7:26:5.0 LTC_BLEM_GAIN_502 127001 180 7:27:9.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 460 47.70 1 (400K) SUM2 460 47.70 1 (400K) SUM2 560 47.70 1 (400K) SUM2 560 47.70	130135 195 3:55:15.0 LTC_BLEM_GAIN_511 2 (1 130137 195 3:58:13.0 LTC_BLEM_GAIN_511 2 (1	100K) FULL 680 50.20 100K) FULL 820 50.20 100K) FULL 820 50.20 100K) FULL 820 50.20
127002 180 7:28:13.0 LTC_BLEM_GAIN_502 127003 180 7:29:17.0 LTC_BLEM_GAIN_502 127004 180 7:30:21.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 560 47.70 1 (400K) SUM2 680 47.70 1 (400K) SUM2 680 47.70	130150 195 8:53:26.0 LTC_BLEM_GAIN_512 2 (1 130151 195 8:54:55.0 LTC_BLEM_GAIN_512 2 (1 130152 195 8:56:24.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 5 50.20 LOOK) FULL 5 50.20 LOOK) FULL 5 50.20
127005 180 7:31:25.0 LTC_BLEM_GAIN_502 127006 180 7:32:6.0 LTC_BLEM_GAIN_502 127007 180 7:33:10.0 LTC_BLEM_GAIN_502 127008 180 7:34:14.0 LTC_BLEM_GAIN_502	1 (400K) SUM2 680 47.70 1 (400K) SUM2 820 47.70 1 (400K) SUM2 820 47.70 1 (400K) SUM2 820 47.70	130154 195 8:58:58.0 LTC_BLEM_GAIN_512 2 (1 130186 195 9:53:17.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 30 50.20 LOOK) FULL 30 50.20 LOOK) FULL 30 50.20 LOOK) FULL 60 50.20
127120 183 6:33:4.0 LTC_BLEM_GAIN_503 127121 183 6:33:55.0 LTC_BLEM_GAIN_503 127122 183 6:34:23.0 LTC_BLEM_GAIN_503	0 (1400K) SUM4 5 58.80 0 (1400K) SUM4 5 58.80 0 (1400K) SUM4 15 58.80	130157 195 9:3:26.0 LTC_BLEM_GAIN_512 2 (1 130158 195 9:4:55.0 LTC_BLEM_GAIN_512 2 (1 130159 195 9:6:0.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 60 50.20 LOOK) FULL 60 50.20 LOOK) FULL 80 50.20
127124 183 6:36:5.0 LTC_BLEM_GAIN_503 127126 183 6:37:47.0 LTC_BLEM_GAIN_503 127127 183 6:38:38.0 LTC_BLEM_GAIN_503 127128 183 6:39:8.0 LTC_BLEM_GAIN_503	0 (1400K) SUM4 15 58.80 0 (1400K) SUM4 25 58.80 0 (1400K) SUM4 25 58.80 0 (1400K) SUM4 30 58.80	130187 195 9:54:23.0 LTC_BLEM_GAIN_512 2 (1 130162 195 9:10:28.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 80 50.20 LOOK) FULL 80 50.20 LOOK) FULL 150 50.20 LOOK) FULL 150 50.20
127130 183 6:40:50.0 LTC_BLEM_GAIN_503 127132 183 6:42:32.0 LTC_BLEM_GAIN_503 127133 183 6:43:23.0 LTC_BLEM_GAIN_503	0 (1400K) SUM4 30 58.80 0 (1400K) SUM4 70 58.80 0 (1400K) SUM4 70 58.80 0 (1400K) SUM4 120 58.80	130166 195 9:16:0.0 LTC_BLEM_GAIN_512 2 (1 130188 195 9:55:29.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 150 50.20 LOOK) FULL 260 50.20 LOOK) FULL 260 50.20 LOOK) FULL 260 50.20
127136 183 6:45:35.0 LTC_BLEM_GAIN_503 127138 183 6:47:17.0 LTC_BLEM_GAIN_503 127139 183 6:48:8.0 LTC_BLEM_GAIN_503	0 (1400K) SUM4 120 58.80 0 (1400K) SUM4 150 58.80 0 (1400K) SUM4 150 58.80	130168 195 9:18:59.0 LTC_BLEM_GAIN_512 2 (1 130170 195 9:21:57.0 LTC_BLEM_GAIN_512 2 (1 130171 195 9:23:2.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 380 50.20 LOOK) FULL 380 50.20 LOOK) FULL 460 50.20
127140 183 6:48:36.0 LTC_BLEM_GAIN_503 127142 183 6:50:18.0 LTC_BLEM_GAIN_503 127144 183 6:52:0.0 LTC_BLEM_GAIN_503 127145 183 6:52:51.0 LTC_BLEM_GAIN_503	0 (1400K) SUM4 180 58.80 0 (1400K) SUM4 180 58.80 0 (1400K) SUM4 260 58.80 0 (1400K) SUM4 260 58.80	130173 195 9:26:0.0 LTC_BLEM_GAIN_512 2 (1 130174 195 9:27:30.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 460 50.20 LOOK) FULL 460 50.20 LOOK) FULL 560 50.20 LOOK) FULL 560 50.20
127146 183 6:53:19.0 LTC_BLEM_GAIN_503 127148 183 6:55:1.0 LTC_BLEM_GAIN_503 126886 180 2:51:49.0 LTC_BLEM_GAIN_504	0 (1400K) SUM4 320 58.80 0 (1400K) SUM4 320 58.80 2 (100K) FULL 5 50.20	130176 195 9:30:28.0 LTC_BLEM_GAIN_512 2 (1 130177 195 9:31:33.0 LTC_BLEM_GAIN_512 2 (1 130179 195 9:34:31.0 LTC_BLEM_GAIN_512 2 (1	LOOK) FULL 560 50.20 LOOK) FULL 680 50.20 LOOK) FULL 680 50.20
126887 180 2:53:18.0 LTC_BLEM_GAIN_504 126888 180 2:54:47.0 LTC_BLEM_GAIN_504 126889 180 2:55:53.0 LTC_BLEM_GAIN_504 126890 180 2:57:22.0 LTC_BLEM_GAIN_504	2 (100K) FULL 5 50.20 2 (100K) FULL 5 50.20 2 (100K) FULL 30 50.20 2 (100K) FULL 30 50.20	130180 195 9:36:1.0 LTC_BLEM_GAIN_512 2 (1 130181 195 9:37:30.0 LTC_BLEM_GAIN_512 2 (1	100K) FULL 680 50.20 100K) FULL 820 50.20 100K) FULL 820 50.20 100K) FULL 820 50.20
126891 180 2:58:51.0 LTC_BLEM_GAIN_504 126892 180 3:0:20.0 LTC_BLEM_GAIN_504 126893 180 3:1:49.0 LTC_BLEM_GAIN_504	2 (100K) FULL 30 50.20 2 (100K) FULL 60 50.20 2 (100K) FULL 60 50.20	130194 195 10:41:17.0 LTC_BLEM_GAIN_513 1 (4 130195 195 10:42:21.0 LTC_BLEM_GAIN_513 1 (4 130196 195 10:43:25.0 LTC_BLEM_GAIN_513 1 (4 14 14 14 14 14 14 14 14 14 14 14 14 14	400K) SUM2 5 47.70 400K) SUM2 5 47.70 400K) SUM2 5 47.70
126894 180 3:3:18.0 LTC_BLEM_GAIN_504 126895 180 3:4:24.0 LTC_BLEM_GAIN_504 126923 180 4:23:39.0 LTC_BLEM_GAIN_504 126928 180 4:32:55.0 LTC_BLEM_GAIN_504	2 (100K) FULL 60 50.20 2 (100K) FULL 80 50.20 2 (100K) FULL 80 50.20 2 (100K) FULL 80 50.20		100K) SUM2 35 47.70 100K) SUM2 35 47.70 100K) SUM2 35 47.70 100K) SUM2 50 47.70
126898 180 3:8:51.0 LTC_BLEM_GAIN_504 126899 180 3:10:20.0 LTC_BLEM_GAIN_504 126924 180 4:25:8.0 LTC_BLEM_GAIN_504 126902 180 3:14:36.0 LTC_BLEM_GAIN_504	2 (100K) FULL 150 50.20 2 (100K) FULL 150 50.20 2 (100K) FULL 150 50.20 2 (100K) FULL 260 50.20	130201 195 10:48:20.0 LTC_BLEM_GAIN_513 1 (4) 130202 195 10:49:24.0 LTC_BLEM_GAIN_513 1 (4) 130203 195 10:50:6.0 LTC_BLEM_GAIN_513 1 (4) 130203 195 10:50:60:60:60:60:60:60:60:60:60:60:60:60:60	100K) SUM2 50 47.70
126903 180 3:16:5.0 LTC_BLEM_GAIN_504 126925 180 4:26:14.0 LTC_BLEM_GAIN_504 126904 180 3:17:34.0 LTC_BLEM_GAIN_504	2 (100K) FULL 260 50.20 2 (100K) FULL 260 50.20 2 (100K) FULL 380 50.20	130205 195 10:52:14.0 LTC_BLEM_GAIN_513 1 (4 130206 195 10:53:19.0 LTC_BLEM_GAIN_513 1 (4 130207 195 10:54:23.0 LTC_BLEM_GAIN_513 1 (4	100K) SUM2 70 47.70 100K) SUM2 150 47.70 100K) SUM2 150 47.70
126905 180 3:19:3.0 LTC_BLEM_GAIN_504 126906 180 3:20:32.0 LTC_BLEM_GAIN_504 126907 180 3:21:38.0 LTC_BLEM_GAIN_504 126908 180 3:23:7.0 LTC_BLEM_GAIN_504	2 (100K) FULL 380 50.20 2 (100K) FULL 380 50.20 2 (100K) FULL 460 50.20 2 (100K) FULL 460 50.20	130209 195 10:56:5.0 LTC_BLEM_GAIN_513 1 (4 130210 195 10:57:9.0 LTC_BLEM_GAIN_513 1 (4	100K) SUM2 150 47.70 100K) SUM2 220 47.70 100K) SUM2 220 47.70 100K) SUM2 220 47.70
126929 180 4:34:1.0 LTC_BLEM_GAIN_504 126910 180 3:26:5.0 LTC_BLEM_GAIN_504 126911 180 3:27:34.0 LTC_BLEM_GAIN_504	2 (100K) FULL 460 50.20 2 (100K) FULL 560 50.20 2 (100K) FULL 560 50.20	130212 195 10:59:18.0 LTC_BLEM_GAIN_513 1 (4 130213 195 11:0:22.0 LTC_BLEM_GAIN_513 1 (4 130214 195 11:1:26.0 LTC_BLEM_GAIN_513 1 (4	400K) SUM2 320 47.70 400K) SUM2 320 47.70 400K) SUM2 320 47.70
126912 180 3:29:3.0 LTC_BLEM_GAIN_504 126913 180 3:30:9.0 LTC_BLEM_GAIN_504 126914 180 3:31:38.0 LTC_BLEM_GAIN_504 126915 180 3:33:7.0 LTC_BLEM_GAIN_504	2 (100K) FULL 560 50.20 2 (100K) FULL 680 50.20 2 (100K) FULL 680 50.20 2 (100K) FULL 680 50.20	130216 195 11:3:12.0 LTC_BLEM_GAIN_513 1 (4 130217 195 11:4:16.0 LTC_BLEM_GAIN_513 1 (4	100K) SUM2 380 47.70 100K) SUM2 380 47.70 100K) SUM2 380 47.70 100K) SUM2 460 47.70
126917 180 3:36:5.0 LTC_BLEM_GAIN_504 126918 180 3:37:34.0 LTC_BLEM_GAIN_504 126927 180 4:28:36.0 LTC_BLEM_GAIN_504 129876 194 13:41:48.0 LTC_BLEM_GAIN_510	2 (100K) FULL 820 50.20 2 (100K) FULL 820 50.20 2 (100K) FULL 820 50.20 3 (40K) FULL 5 42.80	130220 195 11:7:29.0 LTC_BLEM_GAIN_513 1 (4 130221 195 11:8:11.0 LTC_BLEM_GAIN_513 1 (4	100K) SUM2 460 47.70 100K) SUM2 460 47.70 100K) SUM2 560 47.70 100K) SUM2 560 47.70
129877 194 13:43:17.0 LTC_BLEM_GAIN_510 129878 194 13:44:46.0 LTC_BLEM_GAIN_510 129879 194 13:45:51.0 LTC_BLEM_GAIN_510	3 (40K) FULL 5 42.80 3 (40K) FULL 5 42.80 3 (40K) FULL 15 42.80	130223 195 11:10:19.0 LTC_BLEM_GAIN_513 1 (4 130224 195 11:11:24.0 LTC_BLEM_GAIN_513 1 (4 130225 195 11:12:28.0 LTC_BLEM_GAIN_513 1 (4	100K) SUM2 560 47.70 100K) SUM2 680 47.70 100K) SUM2 680 47.70
129880 194 13:47:20.0 LTC_BLEM_GAIN_510 129881 194 13:48:49.0 LTC_BLEM_GAIN_510 129882 194 13:50:19.0 LTC_BLEM_GAIN_510 129883 194 13:51:48.0 LTC_BLEM_GAIN_510	3 (40K) FULL 15 42.80 3 (40K) FULL 15 42.80 3 (40K) FULL 30 42.80 3 (40K) FULL 30 42.80	130233 195 12:28:44.0 LTC_BLEM_GAIN_514 0 (1 130234 195 12:29:35.0 LTC_BLEM_GAIN_514 0 (1	100K) SUM2 680 47.70 1400K) SUM4 5 58.80 1400K) SUM4 5 58.80 1400K) SUM4 5 58.80
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